**Lynch Bridge**
Spanning Black River at River Road
Town of Levis
Clark County
Wisconsin

HAER No. WI-63

HAER
WIS,
10-LEV,
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Rocky Mountain Regional Office
National Park Service
P.O. Box 25287
Denver, Colorado 80225

HAER
WIS,
10-LEV,
1-

HISTORIC AMERICAN ENGINEERING RECORD

**Lynch Bridge**

HAER No. WI-63

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| Location: | Spanning Black River at River Road<br>Town of Levis, Clark County, Wisconsin<br><br>UTM: Zone 16 Easting 687878 Northing 4930127<br>Quad: Columbia |
| Date of Construction: | 1940 |
| Builder: | Wausau Iron Company |
| Present Owner: | Town of Levis |
| Present Use: | Vehicular |
| Significance: | Of the four Pennsylvania truss bridges that were identified in Cultural Resources in Wisconsin, the state's manual for historic properties, the Lynch Bridge is one of only two that remain today. It is significant, therefore, as a rare example of this unique type of truss in Wisconsin. In addition, the bridge is significant because it was designed and built by a private at a time when the State Highway Commission of Wisconsin was designing virtually all bridges built in the state. |

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Date of erection: 1940 [1]

2. Architect: Unknown

3. Original and subsequent owners: public ownership

4. Builders, suppliers:

A. Builders: Wausau Iron Company

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[1] Truss-Bridge Intensive Survey Form, Wisconsin department of Transportation, Madison, Wisconsin

B. Suppliers: Wausau Iron Company

5. Alterations and additions: This bridge does not appear to have been altered or changed. Its historical fabric is excellent.

B. Historical Context:

TRUSS BRIDGES IN WISCONSIN

[The Wisconsin Department of Transportation sponsored a study of truss bridges in the state in 1987. A report authored by Jeffrey A. Hess, Robert M. Frame, and Robert S. Newbery was the major product of this project. The following material is taken directly from that report, although in some cases editorial changes are made to create a concise version herein. Footnote numbers differ from those in the original text, but their placement is identical. Footnotes are also transcribed exactly as written by Hess, Frame and Newbery. The reader is directed to Hess, Frame and Newbery for bibliographical references.]

On Wisconsin highways, the predominance of metal-truss bridges for crossings of all lengths seems to have lasted from about 1890 to 1910. Trusses remained an important bridge type in Wisconsin until the advent of World War II, but after 1910, most short crossings (less than 35 feet) employed girder, beam, or slab spans of steel and/or concrete. The Wisconsin State Highway Commission (SHC), established in 1911 to improve the quality of road and bridge construction in the state, was particularly enthusiastic about using concrete for culverts and small bridges.[2]

The two truss designs that came to dominate highway

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[2]Hans Nelson Brue, "The Development of Highway Bridges in Wisconsin," Bachelors Thesis in Civil Engineering, University of Wisconsin, 1916, pp. 4-5. The historical record is sketchy here, and there is no reliable census of bridges by type for this period. The 1880s and 1890s saw a large number of metal trusses built, often with some controversy of the higher first cost when compared to the familiar old wooden bridge. It was not just a phenomenon of the late 19th century. simple wood beam, beam and pier, and truss bridges were recommended for the cost-conscious land owner in Frederick S. Langa's "Bridge Your Way to a Low-Cost Lot," Rodale's New Shelter, April 1981, pp. 66-75.

bridge construction by the late nineteenth century were the Warren and the Pratt. The Warren truss was patented by two British engineers in 1840. In this design, the vertical members handle only nominal stress, while the diagonals serve as both tension and compression members. The vertical members, like the diagonals, were usually paired angles, but of smaller dimension. In Wisconsin, Warren trusses are by far the most common type of highway truss, having been promoted by the SHC after 1911. Of the approximately 450 Warren trusses in Wisconsin in 1980, over four-fifths were riveted pony trusses built according to SHC standard plans.[3]

The Pratt truss, patented by Caleb and Thomas Pratt in 1844, features vertical compression members and diagonal tension members. Although originally built as a combination bridge, however, the Pratt had the advantage because it used less iron and was easier to erect. The oldest existing truss bridge in Wisconsin, the 1877 White River Bridge in Burlington, is a Pratt.[4]

During the 1870s, an important variation of the Pratt design was introduced for long span bridges. Because the depth of truss required in the center of a bridge is greater than at the abutments, a considerable amount of material can be saved on a long span structure by "bending" the top chord into a polygonal configuration known as a "Parker" truss. If the top chord has exactly five sides, the bridge, by convention, is called a "camelback" truss. The addition of substruts and/or subties makes a Pratt into a Baltimore and a Parker into a Pennsylvania.[5]

The Pennsylvania truss was a "major advance in strengthening the Pratt truss." The Pennsylvania's distinctive features, an inclined top chord for

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[3]T. Allan Comp and Donald Jackson, "Bridge Truss Types: A guide to Dating and Identifying," American Association for State and Local History, Technical Leaflet 95, History News, 32 (May 1977): Working Files, HBAC.

[4]Comp and Jackson, "Bridge Truss Types." A few small Howe trusses were built, including, apparently, one built in Watertown in 1875. Kromm, "Milford Bridge, p. 2.

[5]Comp and Jackson, "Bridge Truss Types."

economy of material and panel subties or substruts for greater strength, were a response to the increasing live loads of railroad locomotives and rolling stock. This style truss is generally found in the United States with lengths of 250 to 600 feet.[6] None of Wisconsin's remaining Pennsylvania's are of such length. The preference in Wisconsin seems to have been for multiple-span bridges with shorter span lengths. The longest known Pennsylvania truss in Wisconsin is the 1908 Cobban Bridge with two spans of 241 feet each. The Cobban Bridge is the only other Pennsylvania truss bridge extant in Wisconsin.

[The Lynch Bridge, the subject of this report, is a 210 foot, single span, Pennsylvania Truss.]

THE STATE HIGHWAY COMMISSION (SHC)

[The following material is taken directly from the aforementioned Hess, Frame, Newbery report.]

The involvement of local governments in bridge repair, replacement, and construction projects was the subject of numerous laws in the late 19th century. With the Good Roads Movement of the late 1890s and early 1900s, a specific set of proposals were put forth for greater involvement by the State government in promoting good quality bridges.[7]

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[6]American Association for State and Local History Technical Leaflet 95, History News, Vol. 32, No. 5, May 1977; T. Allan Comp and Donald jackson, "Bridge Truss Types: A g]Guide to Dating and Identifying," pp. 5, 6-7. See also J.A.L. Waddell, Bridge Engineering (New York: 1921), pp. 176, 177; J.B. Johnson, W.W. Bryan, and F.E. Turneaure, The Theory and Practice of Modern Framed Structures (New York, 1905, (1893)), p. 275; Milo S. Ketchum, The Design of Highway Bridges (New York: 1908), p. 212; Henry G. Tyrrell, History of Bridge Engineering (Chicago: 1911), pp. 184-192.

[7]Ballard Campbell, "The Good Roads Movement in Wisconsin, 1890-1911," Wisconsin Magazine of History, 49 (Summer 1966), pp. 273-93; M.C. Davis, A History of Wisconsin Highway Development, 1825-1945 (Madison, 1947), pp. 218-222; Wisconsin Statutes, Second Session of the Legislature, January 10, 1849 (Southport, 1849), pp. 182-183; Town Laws of Wisconsin, 1858, p. 157; Legislature of Wisconsin, Private and Local Laws, 1867, pp. 60-61, 179-182; Laws of Wisconsin, 1881, Chapter 315, pp. 407-408; Laws of Wisconsin, 1885, Chapter 187, pp. 162-164; Richard

In 1907, the state legislature established a Highway Division within the Wisconsin Geological and Natural History Survey to conduct experiments in road design and to advise local governments about specific projects. Town governments, traditionally reluctant to hire an independent engineer to assist in bridge building, could now avail themselves of free engineering counsel from the state. At the same time, the legislature required counties to make a commitment to professional oversight and increased funding by appointing "a competent engineer or experienced road builder" to serve as County Highway Commissioner and by levying a tax of not less than one-fourth nor more then two mills on the assessed valuation of all country property for the county road and bridge fund.[8]

In 1908, Wisconsin voters removed the greatest obstacle to creating a progressive statewide system of bridge and highway construction. In that year, by a three-to-one margin, they eliminated the state's constitutional prohibition against direct state aid to transportation projects. When the Legislature made its first appropriation for highway improvements in 1911, it also transformed the Highway Division of the Geological Survey into autonomous State Highway Commission (SHC), which was given the responsibility of overseeing the expenditure of state funds for the development of a state highway network.[9]

Like the former Highway Division, the SHC emphasized the use of standardized plans for various types of bridges and culverts.[10] The first set of standardized truss plans encompassed spans ranging from 36 to 128

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N. Current, The History of Wisconsin: Volume 2, The Civil War Era, 1848-1873 (Madison, 1976), p. 28; Robert Nesbit, Wisconsin, A History (Madison, 1973), p. 197. A sampling of available county board records suggest that county-aid bridge projects were infrequent during the 1880s, and numbered five to ten per county per year during the 1890s.

[8]Campbell, "Good Roads," p. 278-79; Laws of Wisconsin, 1907 (Madison, 1907), Chapter 552, p. 292.

[9]Campbell, "Good Roads," pp. 279-84; Davis, Wisconsin Highway Development, p. 104.

[10]SHC, Second Biennial Report, July 1, 1911 to January 1, 1915 (Madison, 1915), p. 24.

feet, generally in five-foot increments. All but one had a sixteen-foot roadway. Revised several times by the 1920s, these plans gradually provided for wider bridges, and continually incorporated the latest engineering wisdom and detailing.[11]

In the first three and one-half years of its work, the SHC designed over 1,500 bridges of all types. All were designed to carry a live load of 15 tons. Believing firmly in the use of reinforced concrete to "the fullest extent practical," the SHC was pleased that all but three of their designs had concrete floors. These figures included almost 900 bridges requested by local governments in 70 counties. Practically all the local bridges in the state during these years were either designed by the SHC or were based on SHC standard plans.[12]

Despite its enthusiastic support for concrete construction, the SHC declared in 1926 that the steel bridge "is not looked upon with disfavor," and it continued to refine its truss designs. In the late 1930s, it made a major commitment to keeping its standardized plans up to date by dropping the Pratt design in favor of the Warren all overhead truss configurations. Newly completed SHC designed truss bridges, both monumental and modest, also continued to be featured in the photographic sections of the agency's biennial reports. Nevertheless, the SHC clearly favored concrete spans, citing advantages of lower cost, greater compatibility with aesthetic treatment, and greater adaptability to remodeling, especially in terms of roadway widening.[13] The metal

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[11]WisDOT, Bridge Section, Microfilm Reel M-1.

[12]Davis, Wisconsin Highway Development, pp. 112-13; SHC, Second Biennial Report, pp. 21, 14, 30; see also SHC, Preliminary Biennial Report, July 1, 1911 to january 1, 1913 (Madison, 1913), p. 17

[13]The SHC succinctly assessed the pros and cons of steel and concrete bridges in its Sixty Biennial Report, 1925-1926 (Madison, 1926), p. 67. From 1911 to 1915, truss bridges in Wisconsin cost considerably less per foot than concrete structures, but then steel began its "great advance in price." See SHC, Fourth Biennial Report, 1916-1918 (Madison, 1918), pp. 11-12; see also the comparative cost chart in Engineering News, 47 (February 28, 1917).

truss, however, remained cost effective in many situations, and the SHC continued to design some truss bridges until well after World War II.

[The Lynch Bridge is unique because it was designed by Wausau Iron at a time when the State Highway Commission was designing virtually all bridges built in the state. The reason the Town of Levis was given this latitude is unknown.]

WAUSAU IRON WORKS

[The following material is taken directly from the aforementioned Hess, Frame, Newbery report.]

This company started in 1907 as a branch of Northern Boiler and Iron Works of Appleton, Wisconsin. In 1908 two brothers, Tony and John Heinzen of Manitowoc, took over the facilities. They joined Fred W. Krause of Wausau and incorporated as the Wausau Iron Works with the manufacture of boilers as the principal business.[14] In 1910 the company entered the field of bridge fabrication and erection and was able to compete successfully with the large Milwaukee firms. That same year it built a 20,000 square foot facility, and by 1911 the value of the company was $50,000. it expanded its plant again in 1916, and by 1926 Wausau Iron Works was worth $400,000. It expanded its plant facilities again in 1930.[15]

In 1919, the company went into concrete paving as an extension of its bridge erecting business. The firm added snowplows in the 1920s through a subsidiary arrangement with E.A. Drott, the state sales representative for Caterpillar Tractors. According to one source, Wausau Iron Works dropped its bridge-erection and concrete-paving business in 1933, apparently in response to a new system of qualifications for bidding

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[14]"LOED Corporation History," (two page memo), September 4, 1975; LOED Collection, SHSW. LOED Corporation is a successor to Wausau Iron Works. This report does not mention Krause. The formal incorporation papers, June 16, 1908, list three individuals: A.C. Heinzen, Henry Ellenbecker, and Fred W. Krause, and a capital stock of $25,000. Diane Kromm, "Marathon City Bridge," HAER WI-37, p. 3.

[15]Kromm, "Marathon City Bridge," p. 3; "LOED Corporation History."

on contracts which had been developed by the SHC.[16] According to Emil Krienke, a former employee of Wausau Iron Works, the SHC's new rules were in response to complaints from small bridge builders and contractors that the big firms who did both the fabrication and erection had an unfair monopoly.[17]

In the 1930s Tony Heinzen sold out to his brother, John.[18] The Company apparently continued fabricating steel for bridges as well as building snow plows and steel warehousing. The company continued to be involved in bridge fabrication as late as 1951.[19] The plant was moved to a new location in Wausau in 1953. The firm legally dissolved in 1984.[20]

[Wausau Iron Works designed and fabricated the Lynch Bridge.]

LYNCH BRIDGE

Little is known about the early crossing at that point where the Lynch Bridge exists today. Clark County was originally covered with a white pine, red pine, maple, hemlock and yellow birch forest.[21] As such, it was logged heavily. Logging in the west central part of Wisconsin largely ended by 1900. As the industry cut back its operations in the state, an interest in the

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[16]Ibid.; State Highway commission, Minutes, Vol. 13 (January 1, 1931 to July 1, 1931), pp. 91-96; Vol. 15 (January 1, 1932 to July 1, 1932), pp. 66, 129-34.

[17]George M. Danko, Interview with Emil Krienke, formerly a foreman for Wausau iron Works, Tape 1, Side 1, Part 1, LOED Corporation. "LOED Corporation History" is ambiguous on this point.

[18]Krienke Interview, Tape 5, side 1, Part 1.

[19]See plans for B-61-14 on State Highway 95 over the Trempeleau River, microfilm Bridge Section, WisDOT; the LOED Collection contains company correspondence concerning bridge construction that is dated as late as 1952.

[20]Kromm, "Marathon City Bridge," p. 3.

[21]"Early Vegetation of Wisconsin" (Madison: University of Wisconsin - Extension, Geological and Natural History Survey, 1965) map.

cutover land began to develop. Among other ventures, promoters tried to attract farmers to the cutover. Likely anticipating the traffic that would be created by settlers moving into the cutover, and crops being shipped out of the newly cultivated cutover, railroads built into the area in the last twenty years of the nineteenth century too. It is possible, consequently, that the first bridge at this place on the Black River, which was built in 1894, was intended to provide better access to towns and railroad facilities throughout the county for the new settlers attracted to the cutover.[22] Built at a cost of over $4,500.00, that first bridge was originally the only crossing over the Black River between Neillsville, Clark County, and Hatfield, Jackson County, a distance of approximately twelve miles.

The present bridge was built in 1940 to replace one that had been washed out -- perhaps the original 1894 bridge. It cost a total of $13,000, although only $9,300 was paid to the Wausau Iron Company.[23] The balance probably went to pay the local labor that was hired to put the bridge together. The bridge continues to serve traffic today, a rare example of Pennsylvania truss in Wisconsin.

Clearly, questions remain as to why a bridge across the Black River was situated at this particular place. No evidence was found to suggest that there was a specific, or significant reason. More likely, the original bridge, and subsequently the present bridge, was built to facilitate a slowly evolving need for a river crossing somewhere between Neillsville and Hatfield. The lack of a specific reason for the bridge's placement notwithstanding, its significance as a rare technological artifact in Wisconsin is not diminshed.

## PART II. ARCHITECTURAL INFORMATION

A. General Statement:

1. Architectural Character: The Lynch Bridge was built in 1940. It is an unusually high, as well

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[22]Truss-Bridge Intensive Survey Form.

[23]Ibid.

as narrow, single span, Pennsylvania through truss.

2. Condition of fabric: The bridge has been in service since its construction. Its historic fabric appears to be in good condition, with virtually no alterations. That condition notwithstanding, the structural integrity of the bridge's individual components is thought to be deteriorating as a 12 ton weight limit has been placed on the bridge.

B. Description:

The bridge's overall length is 210 feet, width is 16 feet, and it carries one lane of traffic. Resting on quarried stone abutments that are supported by concrete and re-bar at the base, the traffic deck is carried by eleven floor beams, each of which is an "I" beam. Perpendicular to the floor beams and extending from beam to beam are thirteen, 7 inch, rolled "I"-beam deck stringers. The bottom lateral bracing is comprised of 2.5 inch by 3 inch single angles. The deck is timber with a macadam over-lay.

The floor beams are hung from eleven, double 6 inch channel hip and intermediate verticals with lacing front and back. The inclined endposts and the top chords are 14 inch by 10 inch. Each is two channels, connected with lacing and cover plates. Top lateral bracing is comprised of paired, 2.5 inch angles. The top chords, as well as the horizontal members of the sway bracing, are paired, 2.5 inch angles. The diagonal members of the sway bracing are single, 2.5 inch angles, and the portal bracing, which resembles a trapezoidal "A" shape, is constructed with paired 3.5 inch by 3 inch angles.

Within each panel, the diagonals are fabricated from 3.5 inch by 2.5 inch double angles that are tied with batten plates. The intermediate laterals, which are found in panels 3, 5, 6, 7, 8 and 10, are the unique elements that make this a Pennsylvania truss. Those laterals are comprised of double channels with lacing. Dimensions of these members are 5 inches by 12 inches. Bottom chords are fabricated from double angles tied with batten plates. The sizes of the angles vary from 2.5 inches by 3.75 inches to 3.5 inches by 6 inches.

All major joint connections are riveted.

The Lynch Bridge is a functional, rural structure. In keeping with the original, as well as the contemporary rural setting, it has no ornamentation or decorative features.

C. Setting:

This bridge is located approximately 6 miles south southwest from Neillsville, Wisconsin, on the Black River. Oriented on a northwest/southeast axis, the bridge is surrounded by generally flat farm fields and vacation cottages.

## PART III. SOURCES OF INFORMATION

A. Bibliography:

1. Primary and unpublished sources: None

2. Secondary and published sources:

"Early Vegetation of Wisconsin." Madison: University of Wisconsin Extension, Geological and Natural History Survey, 1965. Map.

Hess, Jeffrey A., Robert M. Frame, Robert S. Newbery. Truss Bridges: Volume II, Historic Highway Bridges of Wisconsin. Madison: Wisconsin Department of Transportation, forthcoming.

Truss-Bridge Intensive Survey Form, Bridge P-10-266, Wisconsin Department of Transportation, Madison, Wisconsin.

Wyatt, Barbara, ed. Culture Resource Management in Wisconsin. Madison: State Historical Society of Wisconsin, 1986.

Prepared by:

John N. Vogel, Ph.D.
Consulting Historian
301 North 73rd Street
Milwaukee, Wisconsin
23 March 1991

PART IV. PROJECT INFORMATION

This project has been sponsored by the Wisconsin Department of Transportation. Mead & Hunt, consulting engineers in Madison, Wisconsin, formally acted as the contracting agency. The project was undertaken by Dr. John N. Vogel, a consulting historian, who provided the photographic work, and the architectural/technical data. Through a report that they prepared for the Wisconsin Department of Transportation, and that provides the context for bridge projects across the state, Jeffrey Hess, Robert Frame and Robert Newbery also contributed significantly to this project.